Or I could've simply named the post 'Saving money by selecting the right light bulb'!

Once upon a time, selecting a light bulb was as simple choosing a 60 watt or a 100 watt bulb, depending upon how bright you want the bulb to be. There was one popular size, you screw in the bulb and you were done!

But light bulbs have come a long way. In case you haven't heard, incandescent bulbs (the one's we are all familiar with!) are being phased out. There are a lot more choices now and and bulbs come in a variety of types, shapes and sizes.

There are three competing technologies when it comes to light bulbs.

The technology of the past: Incandescent bulbs
The technology of the present: CFL bulbs
The technology of the future: LED bulbs

Before we get into specifics, here's a handy cost-benefits table to help you decide which one is the right bulb for you. I've used a standard A19 bulb for comparison.

*Includes energy and replacement costs.

One caveat about bulb lifetime. I've used total lifetime hours for calculation. In reality this will be much less as each time you turn on your bulb, there is an impact on the life of the bulb. Voltage fluctuations too play a role. Also, even the most expensive bulbs don't carry lifetime warranties. So take in these figures with a little bit of skepticism!

The Technology Behind Light Bulbs

A lot of progress has been made with light bulbs and we are finally at a point where we can phase out incandescents. Let's take look at the technology behind these bulbs.

Incandescent Bulb

This is the bulb that Thomas Edison invented. It hasn't changed much in its working principle. When current passes through a metal filament (usually Tungsten), it gives out heat and the side effect of the heat is light. It is encased in a vacuum (or with an inert gas) glass bulb. Otherwise the filament would react with oxygen and burn out.
If you are wondering why Incandescent bulbs are being phased out, it has to do with its poor energy efficiency. There are better choices today.

**In a nutshell:**

*Price*
Least expensive among bulbs

*Power*
Consumes a lot of power compared to CFLs and LEDs

*Life*
Very short life

*Environment*
Highly inefficient

*Size*
Standard

*Dimmable*
All incandescents are dimmable

*Start time*
No warm-up time delay

**Compact Fluorescent Lamp (CFL) Bulbs**

CFL bulbs work on a different principle than incandescent bulbs. CFL bulbs have mercury vapor and coated with phosphor which is activated by a magnetic or an electronic ballast which produces light.

CFLs last 5 to 15 times longer and consumes only 20%-33% of the power that an incandescent bulb consumes. Though they are much more energy efficient, these bulbs are not eco-friendly due to the presence of Mercury. CFLs require special disposal and should not be discarded with regular trash.

CFLs are also more expensive than incandescent bulbs.

**In a nutshell:**

*Price*
CFLs are cheaper than LED bulbs

*Power*
CFLs consume much less power than incandescent bulbs

*Life*
They last 5 to 15 times longer than an incandescent bulb
Price
CFLs are more expensive than incandescent bulbs

Environment
CFLs are not eco-friendly due to the presence of mercury

Size
The light output is determined by the surface area of the phosphor coating (that's why CFLs are never transparent). Hence a larger output would mean a larger bulb

Dimmable
CFLs don't do well with dimmer switches and require special circuitry to achieve that. Even with that, they don't dim as gracefully as incandescent bulbs

Start time
CFLs have a start time delay and some may have an initial flicker. They also take a few seconds to warm up to their full potential.

Light Emitting Diode (LED) Bulbs

LEDs are probably where the future of light bulbs are headed! They have all the advantages of an incandescent bulb and power efficiency of CFLs and last a lot longer! LEDs are called solid state devices (no filaments).

As you saw in the energy comparison table above, to emit equivalent light of a 60 watt incandescent bulb, an LED bulb only requires 7 watts! The higher the wattage, the bigger your electricity bill! And an LED bulb lasts 30 times longer than an incandescent bulb.

The first thing you'll notice about an LED bulb is that it is heavy! The bulb has metal heat sinks to absorb heat which helps in extending the life of the bulb.

In a nutshell:
Price
Expensive

Power
LEDs consume much less power than incandescent and CFL bulbs

Life
They last 8 to 15 times longer than an incandescent bulb and 4 to 5 times longer than a CFL

Environment
Very eco-friendly

Size
Looks futuristic due to metal heat sinks engulfing the bulb. Also heavy to hold
Dimmable
Technically LED bulbs are dimmable, but in reality, they don't do well with traditional incandescent dimmers. Use dimmers marked specially for LED bulbs

Start time
Instant ons

Selecting a Light Bulb

With three different technologies with different energy requirements, you can no longer rely on just watts to select a light bulb. You have to deal with lumens and kelvins now!

Brightness
Lumens measure the brightness of a bulb. The higher the lumen rating, the brighter the bulb.

A 60W incandescent bulb is approximately 800 lumens. Use that as a reference when purchasing LEDs or CFL bulbs

Color Temperature

You can also set the lighting 'mood' by choosing the color temperature, expressed in kelvins.

An Incandescent has a color range of 2700K to 3000K.

As the picture to the left shows, the phrases warm white, cool white, soft white etc., can actually be expressed as numbers.

Watt
This measures energy consumed. The higher the wattage, the more your electricity bill!

Common Bulb Shapes

One other thing you should know about light bulbs is that each shape has a code. Usually a letter or a series of letters followed by a number.

The letter is a hint to the shape of the bulb and the number is the diameter of the largest part of the bulb expressed as eighths of an inch

Here are some common bulb shapes and sizes and their codes:

A19 - Standard bulbs with a maximum diameter of 2.375 inches (stupid imperial system)
PAR30/PAR38 - Floodlights.

What is the difference between PAR 30 and PAR 38?

PAR stands for Parabolic Aluminized Reflector and a PAR30 has a maximum diameter of 3.75”, whereas a PAR38 has a maximum diameter of 4.75”. These bulbs are normally used in recessed light fixtures and knowing the diameter helps since if the bulb is larger than the fixture you won't be able to change the bulb even though both bulbs have the same base.

Normally, PAR30 is used indoors and PAR38 bulbs can be used both indoor and outdoors. Normally, not always! Check the label. You also have dimmable and non-dimmable types in these configurations. Look for those as well as dimmable bulbs are more expensive.

A Note About Dimmers And LED/CFL Bulbs

One thing you can take for granted in an incandescent bulb is dimming. Not so with LEDs or CFLs. By default, LEDs and CFLs are not dimmable. If you are replacing incandescents that have a dimming switch, you need to buy special dimmable version of CFLs and LEDs.

It is better to also replace your old dimmer with dimmer switches that are specially made to work with LEDs and CFLs. I had varying luck with my old incandescent dimmer. It sort of dimmed my dimmable CFL bulbs and didn't dim my dimmable LED bulbs at all! Once I changed the dimmer as well, they dimmed pretty well.

Incandescent Dimmer

LED/CFL Dimmer

Incandescent Bulb Phaseout

Incandescent bulbs are being phased out beginning Jan 2012. The bipartisan bill, EISA ( Energy Independence and Security Act ), was signed by President George W. Bush in 2007.

Here's what you need to know:

- Beginning 2012, 100 watt incandescent bulbs cannot be manufactured or imported into the US
- The next to go will be 75 watt incandescent bulbs beginning 2013, and 40 and 60 watts beginning 2014
- The stores will still be able to sell incandescent bulbs till their stocks run out
- Technically, there is no 'ban' on incandescent bulbs. You are not required to throw away your existing bulbs and if you find incandescent bulbs in stores, you are free to buy them

My Thoughts
Even though newer technologies like CFLs and LEDs have been around for quite sometime now, it took a while to perfect them and make them affordable. A number of countries have already banned incandescent bulbs. It is sad, this has become a political issue here.

A wider adoption of CFLs and LEDs will bring down the price rapidly and this can only happen when cheaper alternatives like incandescents are phased out.

Did you know that a bulb installed in 1901 is burning even today at the Livermore fire station in California?